



ORIGINAL RESEARCH PAPER

Anatomy

PROXIMAL END OF TIBIA: ITS MORPHOMETRY AND CLINICAL SIGNIFICANCE

KEY WORDS: Morphometry, Arthroplasty, Tibia, Meniscus.

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ABSTRACT
INTRODUCTION: Knee joint is modified complex synovial joint perform wide range of three dimension movement. Arthritis of knee joint needs intervention as total knee arthroplasty and unicompartment knee arthroplasty commonly. This study provide useful data for those surgeries. In present study collected data on the morphometry of both tibiofemoral articulation play a unique role in conduction of body weight. Morphometry of tibial plateau is used to guide treatment and monitor outcome of total knee replacement. Measurements of tibia plateau are of immense help in designing tibial prosthesis. **AIM:** My study was aimed at analyzing Three different parameters of tibia were measured and their mean values were determined. **MATERIALS AND METHODS:** In the present study, a total thirty, adult fully ossified dry tibia, unknown sex and without any deformity were collected from Department of Anatomy of Kanti Devi Medical College, Mathura for evaluation. Took various parameter of superior end by using a Vernier caliper and ruler. **RESULT & CONCLUSION:** The TTT area is greater in the right tibia when compared with the left tibia. The mean area of MTC of the right tibia is greater than the area of MTC of the left tibia, whereas the mean area of LTC of the right tibia is smaller than the area of LTC of the left tibia. This study will be useful for anatomist, forensic anthropologist and orthopedics in cases total knee arthroplasty, unicompartment knee arthroplasty and meniscal transplantation.

INTRODUCTION

The human inferior extremity is primarily involved in weight transmission and locomotion. These functional requirements in addition to attainment of erect, bipedal posture resulted in greater strength and stability of the inferior extremities when compared to superior extremities(1). The knee joint is a hinge-type joint that allows flexion and extension movements. Stability of the joint is provided by static and dynamic structures. Static structures are composed of capsules and ligaments, and dynamic structures are composed of muscles and tendons.

Degenerative arthritis of knee joint is common, but treatment is a difficult problem. Especially with increasing age, it leads to serious dysfunction and affects the quality of life of the person negatively(2). The knee joint is a joint formed between the femur, tibia and patella. Fibula is not included in this joint. The proximal end of the tibia is a crucial component of the knee joint through the tibia-femoral articulation and therefore contributes to the day- to -day functioning of the knee. The bone could be fractured (tibia plateau) and injuries to its associated ligaments are common in athletes. It may also be injured in road traffic accidents (3).

Anthropometry refers to the measurement of the human (Cheng et al., 2009) Anthropometry is a series of systematized measuring techniques that express quantitatively the dimensions of the human body and the skeleton and is often viewed as a traditional and perhaps the basic tool of biological anthropology, but it has a long tradition of being used in medical sciences especially in the discipline of Forensic Medicine(4).

Tibial torsion is defined as the physiological displacement of the transverse plane according the distal joint line around the longitudinal axis of the tibia. Most of the complaints of inward and outward pressure in children are related to tibial torsional problems. Proximal tibia deformities can be frontal and

sagittal planar from the deformities originating from the proximal epiphysis and metaphyseal region of the tibia (5). In clinical practice, surgeons do not favor implants with insufficient tibial coverage as this induces the possibility of tibial implant collapse. The tibia was oriented to axes that were defined by the centers of the circles which fit to the medial and lateral plateaus in the transverse plane and the center of the talus(6).

Morphometry of tibial plateau is used to guide treatment and monitor outcome of total knee replacement. Measurements of tibia plateau are of immense help in designing tibial prosthesis.

MATERIAL AND METHOD

Present study was conducted on total thirty(15 right and 15 left) human cadaveric, adult fully ossified dry tibia, unknown sex and without any deformity. bone were collected from Department of Anatomy, Kanti Devi Medical Mathura.

Inclusion criteria: free from sign of erosion, adult type

exclusion criteria: fractured and damaged tibia bone with arthritic changes.

Following parameters were measured in superior surface of upper end of each selected bones:

1. AP diameter of MTC - measured from most anterior point (exactly posteromedial to the attachment of anterior horn of medial meniscus) to most posterior point
2. TD of MTC-measured perpendicular to AP diameter, measuring from medial tubercle to medial margin of medial condyle as straight line.
3. AP diameter of LTC- measured from most anterior point (just lateral to the attachment of anterior horn of lateral meniscus) to most posterior point as the straight line.

4. TD of LTC- measured perpendicular to AP diameter from lateral tubercle to lateral margin of lateral condyle as straight line.

5. TTTC - measured by marking a straight line passing at the middle of medial tubercle and lateral tubercle of intercondylar eminence from most anterior point to the most posterior point. Area of condyle = AP × TD of the condyle. All observed values shown in table 1. All parameter were taken with the help of vernier caliper. The tibia was clamped to facilitate the parameters.

RESULT

The mean AP, TD, and area of MTC of the right tibia are 37.63, 29.76, and 1119.86 respectively. The mean AP, TD, and area of LTC of the right tibia are 36.78, 27.47 and 1008.50 respectively.

The mean AP, TD, and area of MTC of the left tibia are 37.29, 29.34 and 1094.08 respectively. The mean AP, TD, and area of LTC of the left tibia are 37.42, 29.91 and 1119.23.

DISCUSSION

It was reported that the morphology of the medial tibial plateau differs from the lateral tibial plateau (6). The articular surface of the condyles of tibia articulates superiorly with the corresponding condyles of the femur to make the complex knee joint (7). Medial tibial stress syndrome is an overuse injury or repetitive-stress injury of shin area. Numerous bone-related stress alterations occur in the tibia and surrounding musculoskeletal structures when the body is unable to repair properly in response to recurring muscular contraction and tibial strain(8,9). It was reported that some parameters vary from medial and lateral compartment and so this study has reported the morphometric analysis of the tibial condylar area of medial condyle, lateral condyle, area of TTC, and compared them(10).

In present study, the TTTC area is greater in the right tibia when compared with the left tibia. The mean area of MTC of the right tibia is greater than the mean area of MTC of the left tibia, whereas the mean area of LTC of the right tibia is smaller than the area of LTC on the left tibia. All these data similar to Srivastava et al., 2014(13). Most orthopedicians do not support prosthetic implants with deficient tibial circumference as this may influence the possibility of disorientation of tibial implants (11,12).

Side Of Tibia	Mean Area Of TTTC	MTC			LTC		
		Mean AP	Mean TD	Mean Area	Mean AP	Mean TD	Mean Area
RIGHT	73.5	37.63	29.76	1119.86	36.78	27.47	1008.50
LEFT	75.1	37.29	29.34	1094.08	37.42	29.91	1119.23

AP: Anteroposterior, TD: Transverse diameter, TTTC: Total tibial condyle, MTC: Medial tibial condyle



Fig no.01-Superior surface of proximal end of tibia

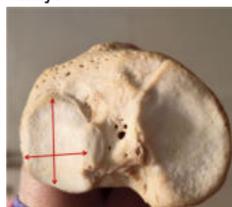


Fig no.02-AP and TD of medial epicondyle

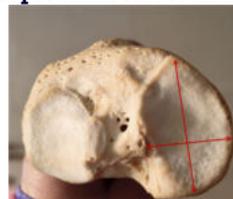


Fig no.03- AP and TD of Lateral epicondyle

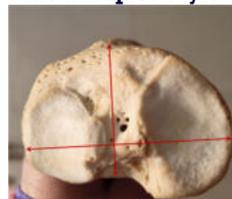


Fig no.04-TTTC of tibial condyle

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